Method and device for milking an animal

FIELD AND BACKGROUND OF THE INVENTION

[0001] The subject matter of the invention relates to a method for machine-milking an animal such as a cow, where a pulsed vacuum with sequential evacuation and ventilation phases is generated in a teat cup by means of an associated pulsator. Although the invention will be described below with reference to an application in the milking of cows, the invention may as well be employed for milking other dairy animals such as goats, sheep, buffaloes, llamas, camels, dromedaries, yaks, etc.

[0002] Methods and devices where a pulsed vacuum with alternating sequential suction and rest phases is generated in a teat cup of a milking unit to allow machine-milking of animals, are known per se.

[0003] In such methods or devices a stimulating phase is performed that is in particular followed by a substantially even, pulsed vacuum generated in the pulse chamber of a teat cup so as to cause a rubber liner in the teat space in the interior of the teat cup to perform a pulsating milking movement.

[0004] To this end the vacuum means of a suction milking installation comprises a vacuum pump, a vacuum valve, pressure connection lines to the teat cups and a control means for generating valve control pulses. The control means generates a valve opening pulse and a valve closing pulse. The vacuum pump of the installation generates a substantially constant vacuum that approximately corresponds to the pulsation pressure.

[0005] At specified fixed intervals, the control means generates control signals for opening the valve of the vacuum device so as to build up a substantially abrupt vacuum in a teat cup gap. Said vacuum is maintained for a specified fixed duration. As is done with vacuum build-up, upon receipt of another control pulse, the pressure in the teat cup gap is abruptly dropped by means of re-evacuating the pulse chamber. This process is repeated continually within a preset pulsation period. Since both pressure build-up and pressure

drop are substantially abrupt, i.e. neglecting the system inertness and the size of installation elements whose volume is involved in vacuum build-up, an animal teat is subjected to an abrupt strain for example in the ventilation phase since the liner will collapse abruptly, whipping upon the delicate teat. This may result in an unpleasant sensation for the animal during milking. In reaction to this sensation the milk production of the animal may be impeded or even suppressed.

[0006] This problem and other drawbacks resulting from abrupt pressure changes have been known. Solutions have already been proposed. A method and a device for controlling and monitoring a suction milking installation are known for example from WO 02/05629 where a pulsed vacuum is generated with alternating sequential pressure changing phases namely, suction and rest phases in a teat cup of a milking unit by means of a pulsator valve. The pulsator valve is actuated through control signals. In the phase transitions for continuous pressure build-up and/or pressure drop, the pulsator valve is repeatedly actuated briefly. This measure influences a pressure curve in the phase transitions so as to allow slower pressure build-up or vacuum build-up, thus achieving a gentler handling by configuring flatter phase transitions. The problems occurring with abrupt liner movements during vacuum build-up or vacuum drop can thus be avoided. The existing pulsator valve is briefly actuated with opening and closing pulses, thus being used to configure flatter pressure curves. A drawback of flatter pressure changes is, however, that the entire duration of the pulse cycle will be longer. Another drawback is a reduced milking speed.

[0007] There is further known from WO 02/23975 A1 a method for milking of milk residues for as complete as possible milking-out of milk present in the udder, in particular in the end phases of milking. According to this method, a liner in a teat cup is caused to move by a suction vacuum through adjustable pulsation phases alternating between suction phases and rest phases and a pulsation intensity so as to obtain a milk flow. The milk volume flow is measured continuously wherein as the volume flow is beginning to decrease the liner movement is specifically altered.